Economic analysis of the formation of global alliance in shipping and airline industries and its impact on markets from the viewpoints of industrial organization

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Background and objectives

- Global alliance as strategic option for global business
- Global alliance more beneficial/important
- Each three alliance in shipping/airline industries
- Objectives are:
  - to examine the formation and development of global alliance in shipping/airline industries
  - to analyze its impact on corporate performance and markets from the viewpoints of industrial organization in economics

Order of presentation

- Changes in cooperative behaviors and regulatory framework in shipping and airline industries
- Details of global alliance and its economic impact on performance
- Impact of formation and development of global alliances on competition in shipping and airline industries

- Changes in cooperative behaviors and regulatory framework in shipping and airline industries

Definition of alliance

- Alliance is cooperative behavior/joint entity which two or more firms pursue, while each firm maintains its own corporate control/governance.
- Cooperative behaviors are subject to antitrust law (competition policy) and penalties without approval
- Most cooperative behaviors in shipping not subject to antitrust; they are antitrust-immunized.
  - shipping conference cartel (both closed and open), TAA(Trans-Atlantic Agreement), TSA(Transpacific Stabilization Agreement), merger and acquisition

Shipping conference (Liner conference)

- Dominating liner services since the first conference was established between U.K.- Calcutta in 1875
- Objective: to avoid competition
- Its function includes:
  - price-fixing cartel on a particular route
  - same tariffs/surcharges and terms setting
  - revenue-sharing and capacity-control
- Currently, losing its power and its price-fixing cartel not working in many routes

Consortium and Global Alliance

- Consortium/Bilateral Alliance
  - cooperative behavior where shipping firms share resources/assets in specific markets through co-ordination of operations and marketing
  - objective: to provide efficient/ convenient services
- Global Alliance/Multilateral Alliance
  - cooperative behavior where more than three firms form a group in global markets rather than specific markets and share resources/assets in wider scope in terms of operation than consortium

Business environments affecting change in cooperative behaviors in shipping industries

- Containerization; enabling intermodal freight transport and reducing entry barrier into liner services
- Integration of world economy and increase in international trade
  - Fragmentation/dispersion of production process across countries through foreign direct investment
  - Customer’s needs for transport more diversified and cost-sensitive
- Implementation of competition policy toward the shipping conference and liberalization in airline services

Competition policy of the US and EU toward shipping conference

- Shipping is operated under less restrictive regulatory framework compared with other service industries, such as finance, telecommunication, and airlines
- Under the principle of "Freedom of the Seas," shipping firms can provide transport service between any two country without restriction.
- Shipping conferences granted antitrust immunity.
- However, review of the antitrust immunity started in EU, the US and other countries.
- In EU, block antitrust immunity to shipping conference has been abolished in 2006.

The Shipping Act of 1984 and the Ocean Shipping Reform Act of 1998 in US

- continued to grant antitrust immunity, simplified and shortened approval process of antitrust immunity, and expanded the scope of immunity into intermodal rates, but
- as competitive measures, ordering shipping conference to allow each conference member to set discounts freely without notifying other members, the so called independent action, and to resort to price-competition in contract of large volume (service contract).

Regulatory Framework for Airlines and their Alliances

- Sharp contrast between shipping and airlines
- Airline services have been operated under severely restrictive bilateral regulatory frameworks, Bermuda and Predetermination:
  - Nationality clause: substantially owned and effectively controlled by nationals of designating countries
  - Capacity, frequency, route and price need approval of government.
  - Few fifth (and sixth) freedoms, allowing airlines to carry traffic beyond a bilateral partner country
- Currently, still most of existing bilaterals are restrictive

Bilateral Liberalization: Open skies

- The U.S. government has been promoting open skies liberalization since 1992.
- No regulation on route between two countries and beyond bilateral partner countries, free capacity, free airfare
- Free alliances and granted antitrust immunity as long as they are pro-competitive
- 94 countries as of April 2009, including Asian countries such as Korea, Indonesia, Taiwan, Singapore, and in January 2010 Japan
- Open skies in other bilateral markets: New Zealand-Australia, Germany-New Zealand, Canada-UK

Multilateral Liberalization: Case of EU

- EU Economic Integration
- Free entry of EU carriers into EU markets, including domestic markets, without capacity/price regulation
- Changing nationality rule: common airline operating licenses and certificates by EU members and free cross-border investment among EU carriers
- EU's horizontal agreement with non-EU countries: removing nationality restrictions and allowing airlines to fly between any EU point and any point of other countries, such as the US, New Zealand and Singapore

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- Details of Global Alliance and its economic impact on performance

Global Alliance in Shipping Liner Services

TNWA

- The New World Alliance
- About 100 vessels
- 13 routes
- APL (Singapore),MOL (Japan), Hyundai (Korea)

GA

- Grand Alliance
- About 140 vessels
- 14 routes
- NYK(Japan), Hapag-Lloyd (Germany), OOCL(Hong Kong), MISC (Malaysia)

CKYH

- CKYH Alliance
- About 170 vessels
- 17routes
- COSCO (China), K Line (Japan), Yang Ming (Taiwan), Hanjin (Korea)

Case of joint-operation in Asia-North America route in TNWA

- 9 loops (including a few loops beyond US west-coast to US east-coast) , average 5-6 weeks, 4000TEUs～6000TEUs
- About 50 vessels
- Major destination ports: Kaohsiung, Hong Kong, Yokohama, Tokyo, Busan, Shanghai in Asia, and LA, Oakland, Vancouver, Seattle in the US
- Extensive intermodal connection to mid-west and east-cost of the US

Case of joint-operation in Asia-North America route: GA

- 9 loops (including a few loops to US east-coast), average 5-6 weeks, 3000TEUs〜8000TEUs
- About 60 vessels
- Major destination ports: Hong Kong, Shanghai, Yokohama, Busan in Asia, LA, Oakland, Seattle, Norfolk, Savannah, New York in the US

Case of joint-operation in Asia-North America route: CKYH

- 4 loops, average 8-9 weeks,3500TEUs〜5500TEUs
- Hong Kong, Shanghai, in U.S. focusing on east-coast ports including Savannah and New York
- Extensive feeder connection in intra-Asia market.

The total number of vessels operated by each member both within and outside global alliances in liner services

TNWA	GA	CKYH
• About 280 • About 100 within global alliance	• About 320 • About 140 within global alliance	• About 370 • About 170 within global alliance

Global alliances in airlines

star alliance	skyteam	oneworld
• since1997 • 15% • 26 members: United, ANA, Lufthansa, SAS, Air Canada, Air China, BMI, Air New Zealand, Asiana,Austrian, Continental,Swiss, Singapore,Thai, TAP, Turkish,US Airways others	• since2000 • 11% • 10 members: Alitalia,China Southern,KLM, Czech,Delta, Northwest, Air France, Aeroflot, Aeromexico, Korean	• since1998 • 11% • 11 members: American, BA, Cathay,Finnair, Iberia, JAL, LAN,Malév, Mexicana, Qantas,Jordanian

Contents of cooperative arrangements in global alliance

- Joint operation: space charter/exchange, revenue pooling, revenue and marketing pooling, codesharing (in airlines), including feeder routes and intermodal freight transport
- Joint marketing, sales and promotion and joint venture in logistics operation
- Single-roof facility strategy: sharing facilities including cargo and passenger terminals, logistics warehouse, handling, offices, check-in counters and airport lounges
- Common procurement in broad range of items, IT platform, management system infrastructure, insurance, oils
- Joint effort/development to reduce fuel consumption/CO2 emission

Economic effects on performance: Positive effects

- Expanding network in terms of frequencies and destinations with limited resources and without additional costs
- Providing more convenient and seamless services to customers
- Obtaining additional flow traffic by establishing effective network, such as hub and spoke network, pendulum services
- Accordingly, increased demand and larger vessels operation, leading to improved productivity and decreased average cost, the so-called economies of density

Economic effects on performance: positive and negative effects

- Learning intangible assets, such as management know-how and reputation, not tradable in the market because such assets immobile and exhibit lack of information
- Increasing monopoly power : negative impact upon consumers in terms of competition policy
- Negative effects:
  - Complicated governance/decision making process
  - Free-riding and opportunistic behaviors
  - Coordination problem among members, particularly in the area of distributing costs and benefits equally among members

Empirical analysis of alliance on profitability: Oum et al.(2004)

- Data: Top 30 major international airlines between 1986 and 1995
- Dependent variables: Profitability and Productivity
- Independent variable: Number of bilateral alliances
- Control variables: relative partner size, cultural similarity, firm size, technological investments, restructuring, route distance, business proportion, etc
- Estimation results: statistically significant and positive relationship between alliances and productivity and positive but not significant relationship between alliances and profitability

- Impact of formation and development of global alliances on competition in shipping and airline industries

Competition policy issues regarding global alliances

- Does the formation of global alliances promote competition or hinder competition in shipping and airline industries?
- How does the subsequently reduced number of players affect competition and price?
- What kind of competition is proceeding in the shipping and airlines industries where the formation of global alliances is progressing?

Basic theories about relationship between number of firms and competition: three market structures

- More Competitive
  - Perfect competition
    - so many firms produce same goods
  - Oligopoly (Duopoly)
    - several firms (two firms) produce same goods
  - Monopoly or Cartel (Joint profit maximization)
    - a single firm dominates market or several firms jointly maximize their profits by forming cartel
- Less Competitive

Definitions

- Quantity/output (Q)
- Price (P)
- Demand curve (DD): Relationship between price and demand (quantity)
- Supply curve (SS): Relationship between price and supply (quantity)
- Marginal cost (MC) : first derivative of total cost function (C)

  (marginal cost=supply)
- Marginal revenue (MR) : first derivative of total revenue

Degree of Competition

- Price: P^X (in Perfect Competition) < Price (in Oligopoly) <P^Y(Monopoly and Cartel)
- Quantity: Q^X(in Perfect Competition) >Q (in Oligopoly)>$Q^{Y(}$Monopoly and Cartel)
- Price-cost margin: (Price-Marginal Cost)/Price
  - the smaller margin, the more competitive,
  - the larger margin, the less competitive,
  - in perfect competition it is 0, larger margin in monopoly and joint profit maximization

Conjectural Variation (1)

- Oligopolistic market where some shipping firms offer same services to many consumers
- Total market supply Q; price P; and inverse total market demand function P＝P(Q)
- Supply of gth shipping firm q_g; Q equal to the sum of each firm's supply
- The gth shipping firm's profit function $\pi g=P(Q)q_g - C_g(q_g)$, where $C_g(q_g)$ is its total cost function
- MCg is marginal cost of the gth shipping firm

Conjectural Variation (2)

gth firm's profit maximization condition:

$$\frac{\partial \pi_g}{\partial q_g} = P + \frac{\partial P}{\partial Q}\frac{\partial Q}{\partial q_g} q_g - \frac{\partial C_g}{\partial q_g} = P + \frac{\partial P}{\partial Q}\frac{\partial Q}{\partial q_g} q_g - MC_g = 0$$

the sum of supply except gth firm: Q-g

Conjectural Variation　(degree of competition)

$$\gamma_g = \frac{\partial Q_{-g}}{\partial q_g}$$

-1 in perfect competition, 0 in Duopoly, (Q/qg)-1 in cartel

Conjectural Variation (3)

Market share of gth firm:sj＝(qj/Q)

price elasticity of demand:

$$\alpha = -\frac{\partial Q}{Q}\frac{P}{\partial P}$$

Conjectural variation expressed as follow

$$\gamma g = \frac{P - MCg}{P}\frac{\alpha}{sg} - 1$$

Estimation results of conjectural variations in airline industry

- Chicago-based US domestic routes where United Airlines and American Airlines had 75% market shares combined (Brander/Zhang1990)
  – 0.12 in United and 0.06 in American: Cournot Duopoly
- U.S. domestic routes originating in Atlanta, Delta Air Lines' hub airport (Fischer et al.2003b)
  – Cournot Duopoly in most routes
- Three major Japanese airlines (Endo2005)
  – Between -0.1 and +0.1: duopoly or slightly tougher than duopoly after deregulation of 1986 until 2002

Panzar-Rosse H statistics

- Ｈ＝Σ（（dR*/dWi）（Wi/R*））:sum of elasticities of revenue regarding factor prices
- R* revenue function, Wi factor(i) price
- H shows market structure as well as corporate behaviors
- Less than 0: monopoly or joint monopoly (perfect collusion)
- Between 0 and 1: monopolistic competition and the degree of competition if certain conditions are satisfied
- Equal to 1: perfect competition and contestable

Estimating H statistics in shipping (Endo2005b): specification

- lnR=a0+a1ln(PK)+a2ln(PL) +a3ln(PF)＋ a4ln(realGNP of Japanese economy)
- ln: natural logarithm
- H statistics: a1+a2+a3
- Data: 52 observations collected from Japanese three shipping liner companies (NYK, MOL and K-Line) between 1986 and 2002, panel data
- R:total revenue in liner shipping services

Variables

- PL, PK, PF: factor prices of labor, capital and operation
- PL: real average labor cost composed of such as wages, salaries and benefits
- PF: operation cost divided by deadweight deflated by GDP
- PK: (depreciation cost/tangible fixed assets)+ (interests and bond payment/long-term debt and bond) and then multiplying the result by capital goods price index

Estimation results

- Estimation Method: Fixed-effect model in panel technique
- H statistics 0.53:
- Two hypotheses (H=1,Perfect Competition and H=0,Joint monopoly) are not accepted by F-test.
- From the results, shipping liner firms may not exercise monopoly power and the formation of global alliance may not hinder competition.

Estimations of H statistics in other transport sectors

- European Airlines: 0.17 between 1992 and 1997 and 0.44 between 1997 and 2002 (Endo 2006)
- U.S. truck industry:0.52 (Savage 1995)
- US air transport services departing from Atlanta: positive and more than 1(Fischer et al.2003a)

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